

LISTING OF CLAIMS

Claims 1-30. (Canceled)

31. (Original) An optical disc medium recording and reproducing apparatus in which track marks are arranged at a predetermined distance on a spiral track formed on said optical disc medium, a pickup is moved in the radius direction of said optical disc medium by a moving motor, and operations of recording and reproducing information on said optical disc medium are performed by use of said pickup in a rotative state of a CLV mode caused by a rotation motor of said optical disc medium comprising:

distance calculating means for calculating the distance between said track marks arranged on adjacent tracks on the basis of the detection information of said track marks detected by said pickup;

position detecting means for detecting a position of said pickup in the radius direction of said optical disc medium; and

movement control means for controlling the movement of said pickup to a target address position independently from the setting of said CLV mode by use of said rotation motor on the basis of the distance data between said track marks calculated by said distance calculating means for calculating the distance between said track marks and the position data detected by said position detecting means.

32. (Original) An optical disc medium recording and reproducing apparatus in which track marks are arranged at a predetermined distance on a spiral track formed on said optical disc medium, a pickup is moved in the radius direction of said optical disc medium by a moving motor, and operations of recording and reproducing information on said optical disc medium by use of said pickup in a rotative state of a CLV mode caused by a rotation motor

of said optical disc medium comprising:

distance calculating means for calculating the distance between said track marks arranged on adjacent tracks on the basis of the detection information of said track marks detected by said pickup;

standard position detecting means for detecting a standard position of said pickup in the radius direction of said optical disc medium;

position calculating means for calculating the position of said pickup in the radius direction of said optical disc medium on the basis of the detected standard position of said pickup in the radius direction of said optical disc medium; and

movement control means for controlling the movement of said pickup to a target address position independently from the setting of said CLV mode by use of said rotation motor on the basis of the distance data between said track marks calculated by said distance calculating means for calculating the distance between said track marks and the standard position data calculated by said position calculating means.

33. (Original) A method of recording and reproducing an optical disc medium comprising the steps of:

arranging track marks at a predetermined distance on a spiral track formed on said optical disc medium;

moving a pickup in the radius direction of said optical disc medium by a moving motor;

performing the operations of recording and reproducing information on said optical disc medium by use of said pickup in a rotative state of a CLV mode caused by a rotation motor of said optical disc medium;

calculating the distance between said track marks arranged on adjacent tracks on the basis of the detection information of said track marks detected by said pickup;

detecting a position of said pickup in the radius direction of said optical disc medium;  
and

controlling the movement of said pickup to a target address position independently from the setting of said CLV mode by use of said rotation motor based on the calculated distance between said track marks and the detected position data.

34. (Original) A method of recording and reproducing an optical disc medium comprising the steps of:

arranging track marks at a predetermined distance on a spiral track formed on said optical disc medium;

moving a pickup in the radius direction of said optical disc medium by a moving motor;

performing the operations of recording and reproducing information on said optical disc medium by use of said pickup in a rotative state of a CLV mode caused by a rotation motor of said optical disc medium;

calculating the distance between said track marks arranged on adjacent tracks based on the detection information of said track marks detected by said pickup;

detecting a standard position of said pickup in the radius direction of said optical disc medium;

calculating the position of said pickup in the radius direction of said optical disc medium based on the detected standard position of said pickup in the radius direction of said optical disc medium; and

controlling the movement of said pickup to a target address position independently from the setting of said CLV mode by use of said rotation motor based on the calculated distance between said track marks and the calculated position data of the pickup in the radius direction.

35. (Original) An optical disc master board exposing apparatus comprising:

a laser light source configured to emit laser light for exposing the optical disc master board painted with a photoresist;

an exposure signal generating unit configured to generate an exposure signal in synchronism with a fundamental clock;

a light modulator configured to receive and on and off modulate said emitted laser light on the basis of said exposure signal;

an optical pickup including a focusing optical system configured to receive said on and off modulated laser light from said light modulator and to then focus said received laser light on to said optical disc master board as an exposure spot;

a spindle motor configured to rotate said optical disc master board;

a slider configured to move said optical pickup in a radius direction of said optical disc master board;

a spindle encoder configured to output a pulse train corresponding to the rotation of said spindle motor;

a linear encoder configured to output another pulse train corresponding to the position of said exposure spot on said optical disc master board; and

a movement control loop configured to control the rotation of said spindle motor based on rotation and the pulse train output of said spindle encoder,

wherein said spindle motor and said slider are further configured to be CLV-driven;  
and

wherein the fundamental clock is configured to provide a pulse train divided to have a frequency proportional to an ideal railroad track length and a spindle rotation ordering pulse train and a slider movement ordering pulse train are generated per one revolution of said spindle motor to thereby generate a CLV drive ordering pulse.

36. (Original) The optical disc master board exposing apparatus as defined in claim 35,

wherein, in a segment in which one revolution of said spindle motor is divided by an equal rotation angle or optional rotation angles, the frequency of said pulse train of said fundamental clock is divided and said spindle rotation ordering pulse train and said slider movement ordering pulse train are generated to thereby generate said CLV drive ordering pulse.

37. (Currently Amended) A method of generating a CLV drive ordering pulse in an optical disc master board exposing apparatus comprising the steps of:

emitting laser light from a laser light source for exposing the optical disc master board painted with a photoresist;

generating an exposure signal for exposing said optical disc master board in synchronism with a fundamental clock;

on and off modulating said laser light emitted from said laser light source ~~on~~ based on said exposure signal;

focusing said on and off modulated laser light on to said optical disc master board as an exposure spot;

rotating said optical disc master board by use of a spindle motor;  
moving said optical pickup in ~~the~~ a radius direction of said optical disc master board  
by use of a slider;  
outputting a pulse train corresponding to the rotation of said spindle motor from a  
spindle encoder;  
outputting another pulse train corresponding to the position of said exposure spot on  
said optical disc master board from a linear encoder;  
controlling the rotation of said spindle motor based on the pulse output of said spindle  
encoder;  
CLV-driving said spindle motor and said slider; and  
dividing the frequency of the pulse train of said fundamental clock and generating a  
spindle rotation ordering pulse train and a slider movement ordering pulse train per one  
revolution of said spindle motor to thereby create a CLV drive ordering pulse.

38. (Original) The method of generating the CLV drive ordering pulse in the optical  
disc master board exposing apparatus as defined in Claim 37,

wherein the dividing the frequency of said pulse train of said fundamental clock and  
the generating of said spindle rotation ordering pulse train and said slider movement ordering  
pulse train to thereby generate said CLV drive ordering pulse occurs in a segment in which  
one revolution of said spindle motor is divided by an equal rotation angle or optional rotation  
angles.

39. (Original) A CLV disc format produced by the optical disc master board  
exposing apparatus as defined in Claim 35,

wherein a physical fundamental length is set such that increased railroad track length

during the time period of one revolution of said spindle is made equal to an integral multiple of or a finite number times the period of said fundamental clock;

wherein said increased railroad track length is equal to  $2 \times \pi \times P$  and P is a track pitch;  
and

wherein said finite number has a value that can be realized at a time of performing the calculation by use of hardware or software.

40. (Currently Amended) A CLV disc format produced by the optical disc master board exposing apparatus as defined in Claim 36,

wherein a physical fundamental length is set such that increased railroad track length of a segment in which one revolution of said spindle motor is divided with an equal rotation angle or optional rotation angles is made equal to an integral multiple or a finite number times the period of said fundamental clock;

wherein said increased railroad track length is made equal to  $P \times \theta_c^2 / (2 \times \pi)$ , wherein  $\theta_c$  is an optional rotation angle and P is a track pitch; and

wherein said finite number has a value that can be realized at a time of performing the calculation by use of hardware or software.

41. (Original) A CLV disc format produced by the optical disc master board exposing apparatus as defined in Claim 35,

wherein a physical fundamental length is set such that increased railroad track length of a segment in which one revolution of said spindle motor is divided with an equal rotation angle or optional rotation angles is made equal to an integral multiple of or a finite number times the period of said fundamental clock;

wherein said increased railroad track length is equal to  $\pi \times P$  and P is a track pitch;

and

wherein said finite number has a value that can be realized at a time of performing the calculation by use of hardware or software.

42. (Currently Amended) A CLV disc format produced by the optical disc master board exposing apparatus as defined in Claim 36,

wherein a physical fundamental length is set such that increased railroad track length of a segment in which one revolution of said spindle motor is divided with an equal rotation angle or optional rotation angles is made equal to an integral multiple or a finite number times the period of said fundamental clock;

wherein said increased railroad track length is equal to  $\theta_c^2/(4 \times \pi)$ , wherein  $\theta_c$  is an optional rotation angle and P is a track pitch; and

wherein said finite number has a value that can be realized at a time of performing the calculation by use of hardware or software.

43. (Original) A CLV disc format produced by the optical disc master board exposing apparatus as defined in Claim 35,

wherein a physical fundamental length is set such that increased railroad track length of a segment in which one revolution of said spindle motor is divided with an equal rotation angle or optional rotation angles is made equal to an integral multiple of or a finite number times the period of said fundamental clock;

wherein said increased railroad track length is equal to  $2 \times \pi \times R_0$  and  $R_0$  is the CLV disc format starting radius; and

wherein said finite number has a value that can be realized at a time of performing the calculation by use of hardware or software.



44. (Currently Amended) A CLV disc format produced by the optical disc master board exposing apparatus as defined in Claim 36,

wherein a physical fundamental length is set such that increased railroad track length of a segment in which one revolution of said spindle motor is divided with an equal rotation angle or optional rotation angles is made equal to an integral multiple of or a finite number times the period of said fundamental clock;

wherein said increased railroad track length is equal to  $\theta_c \times R_o$ , wherein  $\theta_c$  is an optional rotation angle and  $R_o$  is the CLV disc format starting radius; and

wherein said finite number has a value that can be realized at a time of performing the calculation by use of hardware or software.

45. (Currently Amended) The CLV disc format as defined in Claim 39,

wherein a revolution rate of said spindle motor at a format exposure starting position and in a state of stopping a lateral movement is made equal to an integral multiple of said fundamental clock frequency in a segment of one rotation angle or a rotation divided by an equal rotation angle or optional rotation angles;

wherein a railroad track length increase per each respective track turn after starting the CLV drive is made equal to  $\pi \times P$  or  $\theta_c^2 / (4 \times \pi)$  at a first track turn and a same length increase is made equal to  $2 \times \pi \times P$  or  $P \times \theta_c^2 \times (2 \times \pi) / (2 \times \pi)$  at a second track turn and other tracks turns subsequent thereto when said CLV drive ordering pulse is generated, wherein  $\theta_c$  is an optional rotational angle; and

wherein the drive of said spindle motor is performed utilizing said CLV drive ordering pulse.

46. (Currently Amended) A method of generating the CLV drive ordering pulse in

the optical disc master board exposing apparatus as defined in Claim 37 further comprising the steps of:

making a revolution rate of said spindle motor at a format exposure starting position and in a state of stopping lateral movement equal to an integral multiple of said fundamental clock frequency in a segment of one rotation angle or the rotation divided by an equal rotation angle or optional rotation angles  $\theta_c$ ;

making a railroad track length increase for a first track turn after starting the CLV drive equal to  $\pi \times P$  or  $\theta_c^2 / (4 \times \pi)$ , wherein P is a track pitch;

making the railroad track length increase per each respective track turn subsequent to the first track turn after starting the CLV drive equal to  $2 \times \pi \times P$  or  $P \times \theta_c^2 / (2 \times \pi)$ ;

generating said CLV drive ordering pulse; and

performing the drive of said spindle motor utilizing said CLV drive ordering pulse.

47. (Currently Amended) A CLV disc format as defined in Claim 41,

wherein a revolution rate of said spindle motor at a format exposure starting position and in a state of stopping a lateral movement is made equal to an integral multiple of said fundamental clock frequency in a segment of one rotation angle or a rotation divided by an equal rotation angle or optional rotation angles  $\theta_c$ ;

wherein a railroad track length increase per each respective track turn after starting the CLV drive is made equal to  $\pi \times P$  or  $[\theta_c^2] \theta_c^2 / (4 \times \pi)$  at a first track turn and the same length increase is made equal to  $2 \times \pi \times P$  or  $P \times \theta_c^2 / (2 \times \pi)$  at a second track turn and other track turns subsequent thereto when said CLV drive ordering pulse is generated, wherein P is a track pitch; and

wherein the drive of said spindle motor is performed utilizing said CLV drive

ordering pulse.

48. (Currently Amended) A method of generating the CLV drive ordering pulse in the optical disc master board exposing apparatus as defined in Claim 38 further comprising the steps of:

making a revolution rate of said spindle motor at a format exposure starting position and in a state of stopping lateral movement equal to an integral multiple of said fundamental clock frequency in a segment of one rotation angle or a rotation divided by an equal rotation angle or optional rotation angles  $\theta_c$ ;

making a railroad track length increase for a first track turn after starting the CLV drive equal to  $\pi \times P$  or  $\theta_c^2 / (4 \times \pi)$ , wherein P is a track pitch;

making the railroad track length increase per each respective track turn subsequent to the first track turn after starting the CLV drive equal to  $2 \times \pi \times P$  or  $P \times \theta_c^2 / (2 \times \pi)$ ;

generating said CLV drive ordering pulse; and

performing the drive of said spindle motor utilizing said CLV drive ordering pulse.

49. (Currently Amended) The CLV disc format as defined in Claim 43,

wherein a revolution rate of said spindle motor at a format exposure starting position and in a state of stopping a lateral movement is made equal to an integral multiple of said fundamental clock frequency in a segment of one rotation angle or a rotation divided by an equal rotation angle or optional rotation angles  $\theta_c$ ;

wherein a railroad track length increase per each respective track turn after starting the CLV drive is made equal to  $\pi \times P$  or  $\theta_c^2 / (4 \times \pi)$  at a first track turn and a same length increase is made equal to  $2 \times \pi \times P$  or  $P \times \theta_c^2 / (2 \times \pi)$  at a second track turn and other track turns subsequent thereto when said CLV drive ordering pulse is generated, wherein P is a

track pitch; and

wherein the drive of said spindle motor is performed utilizing said CLV drive ordering pulse.

50. (Currently Amended) A method of providing the disc format as defined in Claim 40 further comprising the steps of:

making a revolution rate of said spindle motor at a format exposure starting position and in a state of stopping a lateral movement equal to an integral multiple of said fundamental clock frequency in a segment of one rotation angle or a rotation divided by an equal rotation angle or optional rotation angles  $\theta_c$ ;

making a railroad track length increase for a first track turn after starting the CLV drive equal to  $\pi \times P$  or  $\theta_c^2/(4 \times \pi)$ , wherein P is a track pitch;

making the railroad track length increase per each respective track turn subsequent to the first track turn after starting the CLV drive equal to  $2 \times \pi \times P$  or  $P \times \theta_c^2/(2 \times \pi)$ ;

generating said CLV drive ordering pulse; and

performing the drive of said spindle motor utilizing said CLV drive ordering pulse.

51. (Currently Amended) The CLV disc format as defined in Claim 40,

wherein a revolution rate of said spindle motor at a format exposure starting position and in a state of stopping a lateral movement is made equal to an integral multiple of said fundamental clock frequency in a segment of one rotation angle or a rotation divided by an equal rotation angle or optional rotation angles  $\theta_c$ ;

wherein a railroad track length increase per each respective track turn after starting the CLV drive is made equal to  $\pi \times P$  or  $\theta_c^2/(4 \times \pi)$  at a first track turn and a same length increase is made equal to  $2 \times \pi \times P$  or  $P \times \theta_c^2/(2 \times \pi)$  at the second track and other track turns

subsequent thereto and said CLV drive ordering pulse is generated, wherein P is a track pitch; and

wherein the drive of said spindle motor is performed utilizing said CLV drive ordering pulse.

52. (Currently Amended) The method of providing the CLV disc format as defined in Claim 42 further comprising the steps of:

making a revolution rate of said spindle motor at a format exposure starting position and in a state of stopping a lateral movement equal to an integral multiple of said fundamental clock frequency in a segment of one rotation angle or a rotation divided by an equal rotation angle or optional rotation angles  $\theta_c$ ;

making a railroad track length increase for a first track turn after starting the CLV drive equal to  $\pi \times P$  or  $\theta_c^2/(4 \times \pi)$ , wherein P is a track pitch;

making the railroad track length increase per each respective track turn subsequent to the first track turn after starting the CLV drive equal to  $2 \times \pi \times P$  or  $P \times \theta_c^2/(2 \times \pi)$ ;

generating said CLV drive ordering pulse; and

performing the drive of said spindle motor utilizing said CLV drive ordering pulse.

53. (Original) A recording medium made by the method as defined in Claim 46.

54. (Original) A recording medium made by the method as defined in Claim 48.

55. (Original) A recording medium made by the method as defined in Claim 50.

56. (Original) A recording medium made by the method as defined in Claim 52.

Claims 57-60. (Canceled)

61. (Original) The optical disc medium recording and reproducing apparatus as defined in claim 31,

wherein, in a spiral track of equal pitch  $P$  formed on the optical disc, a railroad track length  $L$  of the entire spiral track thereof can be expressed as:

$$L = \pi \times (r^2 - R_o^2)/P, \text{ and}$$

$$R = R_o + n \times p(n=1,2,3,\cdots);$$

wherein,  $R_o$  represents a radius position of starting the spiral track,  $r$  represents a radius position of the spiral track for measuring the railroad track length  $L$ ,  $P$  represents the spiral track pitch, and  $n$  is a positive integer that represents a number of each spiral track segment and  $L$  can be expressed as:

$$L = 2 \times \pi \times R_o \times n + n^2 \times \pi \times P(n=1,2,3,\cdots);$$

wherein, railroad track length  $L_n$  of respective spiral track segments can be expressed as:

$$L_n = 2 \times \pi \times R_o + (2 \times n - 1) \times \pi \times P(n=1,2,3,\cdots);$$

with a railroad track turn length difference  $dL$  between adjacent spiral track segments that can be expressed as:

$$dL = 2 \times \pi \times R_o + (2n-1) \times \pi \times P,$$

$$dL = [2 \times \pi \times R_o + \{(2n-1)-1\} \times \pi \times P],$$

$$dL = 2 \times \pi \times P;$$

wherein, when a head position of a specified sector at a standard position is taken as a standard position and the increasing railroad track length ( $\text{sum}dL_m$ ) is obtained at a position preceded by  $m$  tracks, a relationship between increasing railroad track length ( $\text{sum}dL_m$ ) and the other constants can be expressed as:

$$\text{sum}dL_m = 2 \times \pi \times P(1+2+3+\cdots+m); \text{ and}$$

wherein, the track length difference  $dL_m$  between adjacent tracks at the position

preceded by m tracks can be expressed as:

$$dL_m = \pi \times P \times m(m+1) - \pi \times P(m-1) \{(m-1)+1\}$$

$$dL_m = 2 \times \pi \times P \times m.$$

62. (Currently Amended) The optical disc medium recording and reproducing apparatus as defined in claim 32,

wherein, in a spiral track of equal pitch P formed on the optical disc, a railroad track length L of the entire spiral track thereof is:

$$L = \pi \times (r^2 - R_o^2)/P \cdots (1), \text{ and}$$

$$R = R_o + n \times p(n=1,2,3,\cdots);$$

wherein,  $R_o$  represents a radius position of starting the spiral track,  $r$  represents a radius position of the spiral track for measuring the railroad track length L, P represents the spiral track pitch, and  $n$  is a positive integer that represents a number of each spiral track segment, and L can be expressed as;

$$L = 2 \times \pi \times R_o \times n + n^2 \times \pi \times P (n=1,2,3,\cdots);$$

wherein, railroad track length  $L_n$  of respective spiral track segments can be expressed as:

$$L_n = 2 \times \pi \times R_o + (2 \times n - 1) \times \pi \times P (n=1,2,3,\cdots);$$

and a railroad track segment length difference  $dL$  between adjacent spiral track segments can be expressed as:

$$dL = 2 \times \pi \times R_o + (2n-1) \times \pi \times P, \text{ and}$$

$$dL = [2 \times \pi \times R_o + \{(2n-1)-1\} \times \pi \times P],$$

$$dL = 2 \times \pi \times P;$$

wherein, when a head position of a specified sector at a standard position is taken as a

standard position and increasing railroad track length (sumdL<sub>m</sub>) is obtained at a position preceded by m tracks, s relationship between increasing railroad track length (sumdL<sub>m</sub>) and the other constants is:

$$\text{sumdL}_m = 2 \times \pi \times P(1+2+3+\cdots+m);$$

and track length difference dL<sub>m</sub> between the adjacent track segments at the position preceded by m tracks can be expressed as:

$$dL_m = \pi \times P \times m(m+1) - \pi \times P(m-1) \{(m-1)+1\}$$

$$dL_m = 2 \times \pi \times P \times m.$$

63. (Original) The optical disc master board exposing apparatus as defined in claim 35,

wherein, in a spiral track of equal pitch P formed on the optical disc, a railroad track length L of the entire spiral track thereof is:

$$L = \pi \times (r^2 - R_o^2)/P \cdots (1), \text{ and}$$

$$R = R_o + n \times p \quad (n=1,2,3,\cdots);$$

wherein, R<sub>o</sub> represents a radius position of starting the spiral track, r represents a radius position of the spiral track for measuring the railroad track length L, P represents the spiral track pitch, and n is a positive integer that represents a number of each spiral track segment, and L can be expressed as:

$$L = 2 \times \pi \times R_o \times n + n^2 \times \pi \times P \quad (n=1,2,3,\cdots);$$

wherein, railroad track length L<sub>n</sub> of respective spiral track segments can be expressed as:

$$L_n = 2 \times \pi \times R_o + (2 \times n-1) \times \pi \times P \quad (n=1,2,3,\cdots);$$

with a railroad track turn length difference between adjacent spiral track segments



being a constant  $2 \times \pi \times P$  so that the length of each spiral track segment increases by  $2\pi P$  per each of the spiral track segments or, instead of  $2\pi$ , an optional angle is used for a segment unit, then:

$$r = R_o + (s \times \theta_a) \times P / (2 \times \pi) \quad (n=1,2,3,\dots);$$

wherein,  $s$  is the number of the segments and  $\theta_a$  may be allowed to be set at a large value or at a small value;

wherein,  $L$  can then be expressed as:

$$L = R_o \times (s \times \theta_a) + P \times (s \times \theta_a)^2 / (4 \times \pi) \quad (s = 1,2,3,\dots) \text{ and}$$

$$L_a = R_o \times \theta_a + P \times (2 \times s - 1) \times \theta_a^2 / (4 \times \pi) \quad (s = 1,2,3, \dots);$$

wherein, the railroad track length difference  $dL$  between the adjacent tracks is a constant that can be expressed as:

$$dL = P \times \theta_a^2 / (2 \times \pi) = \text{constant};$$

further wherein, a value  $N_a$  of the pulse generator is increased by the length of  $2 \times \pi \times P$  per each of the respective track segments in coincidence with a track segments length increase of  $2 \times \pi \times P$  per one revolution of the spindle, and thereby a CLV drive ordering pulse train is generated, which can be expressed by the following equation:

$$2 \times \pi \times P / L_{cb} = N_{pa.s}; \text{ and}$$

wherein,  $L_{cb}$  is the minimum physical unit length for forming a format on the disc, and data bit, sector, and the track can be formed having an integral multiple of the unit length; and  $N_{pa.s}$  includes an infinitely small fractional part.

64. (Currently Amended) An optical disc master board exposing apparatus comprising:

a laser light source emitting laser light for exposing a glass master board painted with

a photoresist;

an exposure signal generating unit generating an exposure signal for exposing said glass master board in synchronism with a fundamental clock;

a light modulator turning on and off said laser light emitted from said laser light source based on of said exposure signal;

an optical pickup including a focusing optical system for focusing said laser light turned on and off by said light modulator and radiating said same laser light on said glass master board as an exposure spot;

a spindle motor rotating said glass master board;

a slider moving said optical pickup in a radius direction of said glass master board;

a spindle encoder outputting a pulse train corresponding to the rotation of said spindle motor;

a linear encoder outputting another pulse train corresponding to the position of said exposure spot on said glass master board;

a spindle rotation ordering pulse generating circuit for generating a spindle rotation ordering pulse train based on a starting radius position of a spiral, a number of spiral tracks, and a track pitch of said spiral;

a slider movement ordering pulse generating circuit for generating a slider movement ordering pulse train based on the starting radius position of said spiral, the number of said tracks, and the track pitch of said spiral;

a spindle control circuit for performing a feedback control operation of the revolution rate of said spindle motor based on the spindle rotation ordering pulse train and the pulse train from said spindle encoder;

a slider control circuit for performing a feedback control operation of the slider movement based on the slider movement ordering pulse train and the pulse train from said linear encoder; and

a control section for controlling the respective construction elements in accordance with the information from said respective construction elements,

wherein the drive of the spindle motor and that of the slider are respectively controlled in accordance with said spindle rotation ordering pulse train and said slider movement ordering pulse train both generated from the pulse train of the frequency divided fundamental clock having pulse numbers proportional to ~~the~~ an ideal railroad track length determined by the starting radius position of said spiral, the number of said tracks, and the track pitch of said spiral, per each one revolution of said spindle.

65. (Currently Amended) An optical disc master board exposing apparatus comprising:

a laser light source emitting laser light for exposing a glass master board painted with a photoresist;

an exposure signal generating unit generating an exposure signal for exposing said glass master board in synchronism with a fundamental clock;

a light modulator turning on and off said laser light emitted from said laser light source based on said exposure signal;

an optical pickup including a focusing optical system for focusing said laser light turned on and off by said light modulator and radiating said same laser light on said glass master board as an exposure spot;

a spindle motor rotating said glass master board;

a slider moving said optical pickup in a radius direction of said glass master board;  
a spindle encoder outputting a pulse train corresponding to the rotation of said spindle motor;

a linear encoder outputting another pulse train corresponding to the position of said exposure spot on said glass master board;

a spindle rotation ordering pulse generating circuit for generating a spindle rotation ordering pulse train based on a starting radius position of a spiral, a number of spiral segments, and a track pitch of said spiral;

a slider movement ordering pulse generating circuit for generating a slider movement ordering pulse train based on the starting radius position of said spiral, the number of spiral segments, and the track pitch of said spiral;

a spindle control circuit for performing a feedback control operation of the revolution rate of said spindle motor based on of the spindle rotation ordering pulse train and the pulse train from said spindle encoder;

a slider control circuit for performing a feedback control operation of the slider movement based on the slider movement ordering pulse train and the pulse train from said linear encoder; and

a control section for controlling the respective construction elements in accordance with the information from said respective construction elements,

wherein the drive of the spindle motor and that of the slider are respectively controlled in accordance with said spindle rotation ordering pulse train and said slider movement ordering pulse train both generated from the pulse train of the frequency divided fundamental clock having pulse numbers proportional to ~~the~~ an ideal railroad track length

determined by an equal rotation angle or an optional rotation angle  $\Theta_c$  in a spiral segment identified with a line segment on the spiral divided by said equal rotation angle or said optional rotation angle  $\Theta_c$ , per one revolution of said spindle, the start radius position of said spiral, the number of said spiral segments, and the track pitch of said spiral, per each one revolution of said spindle.

66. (Original) A method of controlling a CLV drive including a CLV drive for a spindle motor rotating a glass master board painted with a photoresist and another CLV drive for a slider moving an optical pickup including a focusing optical system for focusing the laser light and radiating the focused laser light onto said glass master board, each said CLV drive being respectively controlled by a spindle rotation ordering pulse train and slider movement ordering pulse train, both pulse trains being generated by a frequency-divided fundamental clock pulse train having a frequency proportional to an ideal railroad track length determined by a start radius position of a spiral track, the number of segments making up the spiral track, and track pitch of said spiral track, per one revolution of said spindle.

67. (Currently Amended) A method of controlling a CLV drive including a CLV drive for a spindle motor rotating a glass master board painted with a photoresist and another CLV drive for a slider moving an optical pickup including a focusing optical system for focusing the laser light and radiating the focused laser light onto said glass master ~~board~~ board, each said CLV drive being respectively controlled by a spindle rotation ordering pulse train and a slider movement ordering pulse train, both pulse trains being generated by a frequency divided fundamental clock pulse train having a frequency proportional to an ideal railroad track length determined by an equal rotation angle or an optional rotation angle  $\Theta_c$  in a segment identified with a line segment on the spiral railroad track divided by said equal

rotation angle  $\Theta_c$ , per one revolution of said spindle, a start radius position of said spiral, the number of said segments, and the track pitch of said spiral, per each one revolution of said spindle.

68. (Original) A CLV disc format constructed with a succession of sectors, wherein, on a first track, with  $R_o$  being a CLV format starting radius and  $P$  being a spiral track pitch, a physical basic length is determined such that a railroad track length per one spindle revolution  $2 \times \pi \times R_o + \pi \times P$  is an integral multiple of a fundamental clock or finite figure times capable of being provided at the time of an operation calculation; and wherein, on the second and subsequent tracks, the physical basic length is determined such that the increasing railroad track length per one spindle revolution  $2 \times \pi \times P$  is an integral multiple of the fundamental clock or finite figure times capable of being provided at the time of the operational calculation.

69. (Original) A CLV disc format constructed with a succession of sectors, wherein, in a first segment with  $R_o$  being a CLV format starting radius and  $P$  being a spiral track pitch, a physical basic length is determined such that a railroad track length of the first segment  $\theta_c \times R_o + P \times \theta_c^2 / (4 \times \pi)$  in the segment identified with the line segment on the spiral track created by dividing one revolution of said spindle with an equal rotation angle or an optional rotation angle  $\theta_c$ ; and

wherein, in a second and subsequent segments, the physical basic length is determined such that the increasing railroad track length of the second and subsequent segments  $P \times \theta_c^2 / (2 \times \pi)$  is an integral multiple of a fundamental clock or finite figure times capable of being provided at the time of an operational calculation.

70. (Original) A recording medium made by practicing an exposing operation by use

of said CLV disc format as defined in Claim 68.

71. (Original) A recording medium made by practicing an exposing operation by use of said CLV disc format as defined in Claim 69.

72. (Original) An optical disc master board exposing apparatus comprising:

laser light source means for emitting laser light for exposing a glass master board painted with a photoresist;

exposure signal generating means for generating an exposure signal in order to expose said glass master board in synchronism with a fundamental clock;

light modulator means for turning on and off said laser light emitted from said laser light source means based on said exposure signal;

optical pickup means including a focusing optical system for focusing said laser light turned on and off by said light modulator means and radiating said same laser light on said glass master board as an exposure spot;

spindle motor means for rotating said glass master board;

slider means for moving said optical pickup means in a radius direction of said glass master board;

spindle encoder means for outputting a pulse train corresponding to the rotation of said spindle motor means;

linear encoder means for outputting another pulse train corresponding to a position of said exposure spot on said glass master board;

spindle rotation ordering pulse generating circuit means for generating a spindle rotation ordering pulse train based on a starting radius position of a spiral, the number of spiral tracks, and the track pitch of said spiral;

slider movement ordering pulse generating circuit means for generating a slider movement ordering pulse train based the starting radius position of said spiral, the number of said spiral tracks, and the track pitch of said spiral;

spindle control circuit means for performing a feedback control operation of the revolution rate of said spindle motor means based on the spindle rotation ordering pulse train and the pulse train from said spindle encoder means;

slider control circuit means for performing a feedback control operation of the slider movement based on the slider movement ordering pulse train and the pulse train from said linear encoder means; and

control means for controlling the respective construction elements in accordance with the information from said respective construction elements,

wherein the drive of the spindle motor means and that of the slider means are respectively controlled in accordance with the spindle rotation ordering pulse train and said slider movement ordering pulse train generated from a pulse train of a frequency divided fundamental clock having pulse numbers proportional to an ideal railroad track length determined by the starting radius position of said spiral, the number of said spiral tracks, and the track pitch of said spiral, per each one revolution of said spindle.

73. (Original) An optical disc master board exposing apparatus comprising:

laser light source means for emitting laser light for exposing a glass master board painted with a photoresist;

exposure signal generating means for generating an exposure signal in order to expose said glass master board in synchronism with a fundamental clock;

light modulator means for turning on and off said laser light emitted from said laser



light source means on the basis of said exposure signal;

optical pickup means including a focusing optical system for focusing said laser light turned on and off by said light modulator means and radiating said same laser light on said glass master board as an exposure spot;

spindle motor means for rotating said glass master board;

slider means for moving said optical pickup means in a radius direction of said glass master board;

spindle encoder means for outputting a pulse train corresponding to the rotation of said spindle motor means;

linear encoder means for outputting another pulse train corresponding to a position of said exposure spot on said glass master board;

spindle rotation ordering pulse generating circuit means for generating a spindle rotation ordering pulse train based on a starting radius position of a spiral, a number of spiral segments, and a track pitch of said spiral;

slider movement ordering pulse generating circuit means for generating a slider movement ordering pulse train based on the starting radius position of said spiral, the number of said spiral segments, and the track pitch of said spiral;

spindle control circuit means for performing a feedback control operation of a revolution rate of said spindle motor means based on of the spindle rotation ordering pulse train and the pulse train from said spindle encoder means;

slider control circuit means for performing a feedback control operation of the slider movement based on the slider movement ordering pulse train and the pulse train from said linear encoder means;

control means for controlling the respective construction elements in accordance with the information from said respective construction elements,

wherein the drive of the spindle motor means and that of the slider means are respectively controlled in accordance with the spindle rotation ordering pulse train and said slider movement ordering pulse train generated from a pulse train of a frequency divided fundamental clock having pulse numbers proportional to an ideal railroad track length determined by an equal rotation angle or an optional rotation angle  $\theta_c$  in a spiral segment identified with a line segment on the spiral divided by said equal rotation angle or said optional rotation angle  $\theta_c$ , per one revolution of said spindle, the start radius position of said spiral, the number of said spiral segments, and the track pitch of said spiral, per each one revolution of said spindle.